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(71) Applicant(s)

Tacit Technology Ltd  
(Incorporated in the United Kingdom)  
Technology House, Lissadel St, Salford,  
GREATER MANCHESTER, M6 6AP, United Kingdom

The University of Salford  
(Incorporated in the United Kingdom)  
School of Art & Design, Centenary Building,  
Peru Street, SALFORD, M3 6EQ, United Kingdom

(72) Inventor(s)

Alexander John Williams  
Adrian Paul Wise  
John Agar Bennett

(74) Agent and/or Address for Service

Tacit Technology Ltd  
Technology House, Lissadel St, Salford,  
GREATER MANCHESTER, M6 6AP, United Kingdom

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(56) Documents Cited

GB 2301036 A

US 5910130 A

US 4867172 A

EP 0344606 A1

US 5445619 A

(58) Field of Search

UK CL (Edition S ) A5R RCQX RGD RGG RGM RGN

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ONLINE: EPODOC, WPI, JAPIO

(54) Abstract Title

Hinged needle guard

(57) A needle guard comprising an arm 5, 6 hinged at its centre 8 attached to a collar 19. The arm 5, 6 has a sheath 1 at its distal end attached to the arm 5, 6 by a hinge 7 which may be integrally moulded. By pushing lever 9, the lugs 12, 13 pivot forcing the meshing teeth 10, 11 to engage and extend the arm 5, 6 longitudinally until the sheath 1 covers the needle tip 2. Snap-fit locks 14, 15 may hold the guard in its extended position where it covers the needle tip. The collar 19 may have a thread for engagement with a luer collar, and the needle guard may be integrally moulded to a syringe body. Alternatively, the needle guard may include a V-shaped spring (16, Fig 2). It may be used with a catheter tube.

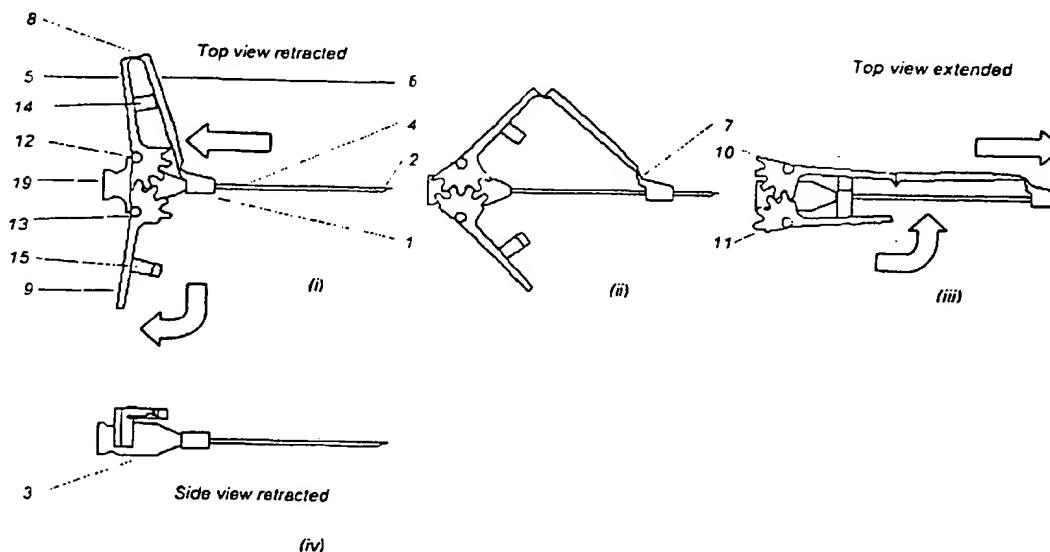


Figure 1

At least one of these pages has been prepared from an original which was unsuitable for direct photoreproduction.

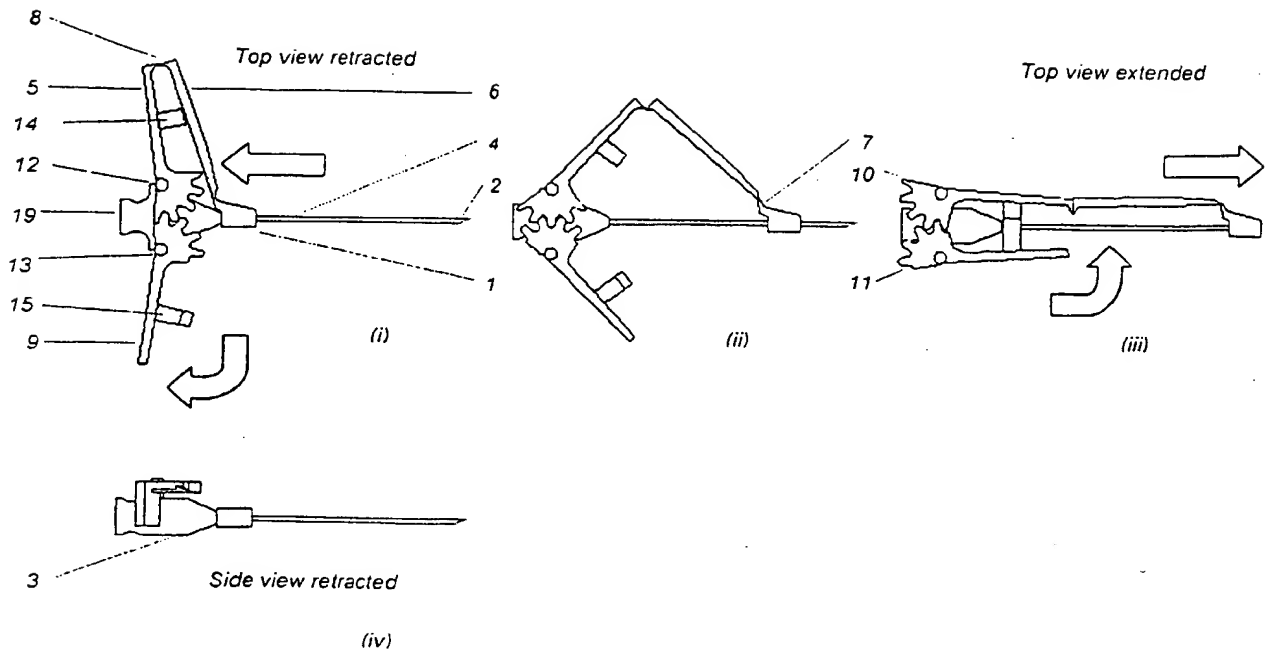


Figure 1

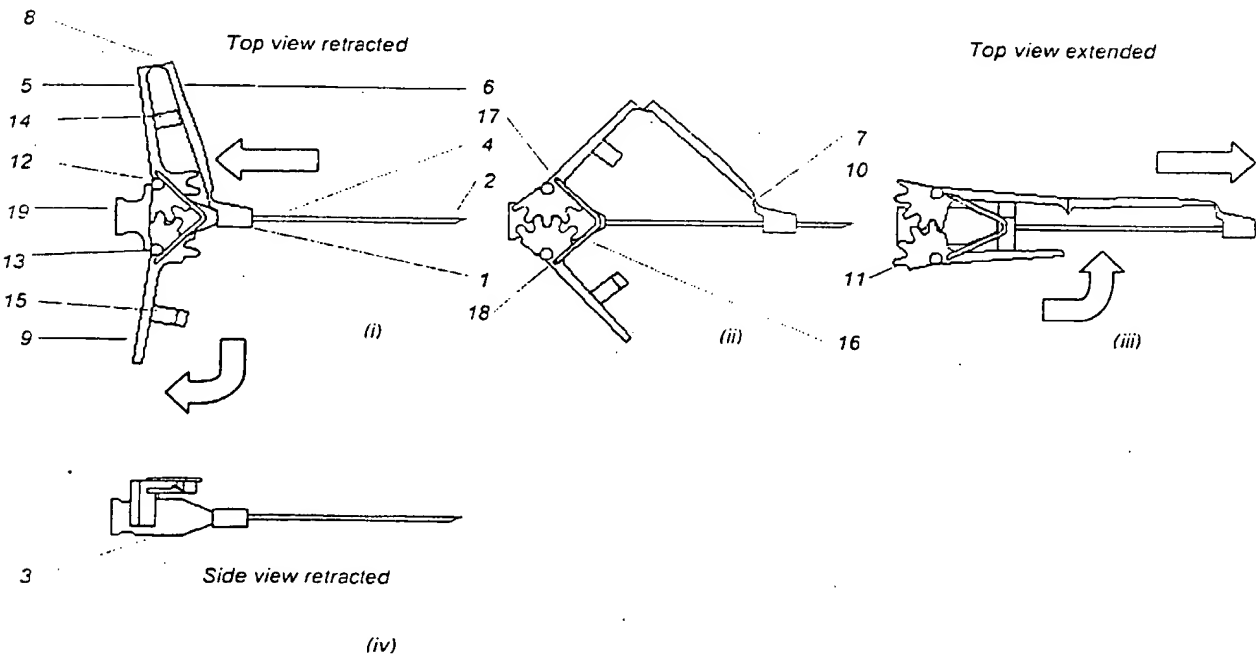


Figure 2

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## Description

### Field of Invention

The invention relates to safety shields for preventing needle-stick related injuries in the use of hypodermic syringes

### Description of Prior Art

Needles are extremely hazardous to handle, as are other sharp implements, & once used may transmit potentially lethal diseases. Currently some 600 000 reported, & an estimated 1 200 000 unreported, needle-stick injuries occur per annum in the UK alone.

A number of solutions are currently available, essentially consisting of either retractable needles or protective sheaths. Retractable needle solutions require changes to the body of the syringe & are therefore relatively non-generic, expensive, & preclude re-use of the syringe. Sheath solutions typically cap the needle from the front, exposing the user to the risk of needle-stick.

Three solutions worthy of note allow approach from the side or rear/proximal end of the needle. The first comprises of a sheath which rotates about the proximal position to enclose the needle from one side; the second consists of a slideable sheath, located to one side of the body of the syringe, which travels along the axis of the needle from its proximal to distal ends; the third comprises a hinged arm assembly connecting a needle guard to a hub, a trigger at its proximal end urging the arm from a collapsed to an extended condition causing the guard to slide along the needle cannula.

### Advantages

- i. The mechanism has two stable states: extended & retracted
- ii. As the mechanism is supplied in its extended condition, there is no need for a separate cap
- iii. The retracted mechanism is only 4mm longer than a conventional collar, allowing full access to the needle. The mechanism collapses within a single plane, to a thickness of only 7mm, allowing the needle to be inserted at extremely shallow angles
- iv. The mechanism may be produced as a three piece injection moulding; assembly is via self-locating snap fits, substantially reducing assembly costs. Tooling for the sheath requires a single retractable core; the remaining components require no cores, allowing multiple parts to be produced per tool & hence achieve economies of scale.
- v. The mechanism can be retro-fitted to any existing standard syringe

### Detailed Description of the Preferred Embodiment

A single hand operated device for the prevention of needle-stick injuries comprises of a hypodermic needle embedded within a two piece moulded shield, which itself comprises of a series of unique features. The concept is based on a slideable crank, in which the sheath (1, *Figure 1*) moves between a distal position where it encapsulates the distal end of the needle (2), & a proximal position, where the distal end is exposed. The collar, or base of the mechanism, (3) grips the needle cannula (4).

A side arm (5, 6) connects the sheath(1) to the collar (3) via an integral live hinge (7), & is hinged on or about its centre (8). The arm articulates between two states, a distended condition in which the sheath is extended over the tip of the needle, & a collapsed condition in which the sheath is retracted along the shaft of the needle. A lever (9), actuated via the user's index finger, engages with & drives the proximal arm via sets of meshing teeth integrally moulded on each (10, 11); the latter pivot about lugs (12, 13) located on the collar & rotate through an articulation of approximately 120 degrees. Pulling the lever towards the collar causes the arm to rotate, retracting the sheath. Conversely, pushing the lever towards the distal end of the needle, causes the sheath to extend.

Although the disposition of the hinges (4, 8) & pivot (10) may allow the arm to act as an over-centre mechanism, the sheath is prevented from collapse in its extended state by the adverse mechanical advantage afforded by the small axial moment (8-10); the latter effectively prevents rotation of the arm. The sheath mechanism may be locked permanently by squeezing the arm & lever together, engaging the snap fit features (14 & 15) mounted on the arm & lever.

In a variant of the mechanism, a 'V' spring (16, *Figure 2*) is added, locking the proximal arm (5) to the lever (9) in one of two stable states, either extended or retracted, in which the ends of the spring (17, 18) lie either inboard or outboard of the lugs (12, 13). Operation of the lever flexes the spring arms, causing the mechanism to alternate between sheathed & collapsed states.

The rear face of the collar (19) presents either a conventional push-fit or threaded luer means of connection to existing syringes.

*Description of the Drawings*

Figs 1.(i), (ii), & (iii) illustrate top views of the preferred three part embodiment in its retracted, partially extended & fully extended states respectively.

Fig 1 (iv) illustrates the side elevation of the retracted mechanism, showing the pivot offset from the needle axis

Figs 2 (i), (ii), & (iii) illustrate top views of the four part sprung embodiment in its retracted, partially extended & fully extended states respectively.

Fig 2 (iv) illustrates the side elevation of the retracted sprung mechanism, showing the location of the spring relative to the needle axis

## Claims

What is claimed:

1. A shielded needle assembly comprising
  - A needle having proximal & distal ends
  - A collar within which the proximal end of the needle is mounted
  - A sheath slidably mounted on said needle, longitudinally moveable from a distal position, where the needle is enclosed, to a proximal position, where the needle is exposed, & vice-versa
  - One arm, hinged at or about its centre, connecting the sheath to the collar, & articulating between two stable states, a collapsed condition in which the sheath is retracted & an erect condition, in which the sheath is extended over the tip of the needle.
  - A lever which engages with the proximal section of the arm via meshing features
2. A device according to claims 1 & 2, incorporating
  - Integrally moulded hinges within the arms of the sheath
3. A device according to claims 1 & 2, incorporating
  - Snap-fit or mechanical fasteners, which retain the sheath in its retracted or extended position, either by locating the sheath onto the collar, the arms onto the collar &/or sheath, or the arm & lever to each other
4. A device according to claims 1 & 2, incorporating
  - Integral or non-integral spring(s), which retain the sheath in its retracted or extended position, either by locating the sheath onto the collar, the arms onto the collar &/or sheath, or the arm & lever to each other
5. A device according to claims 1 & 2, incorporating
  - A means for threaded engagement with a luer collar
6. A device according to claims 1 & 2, in which
  - The mechanism is integrally moulded to the syringe body
7. A device according to claims 1 & 2, incorporating
  - Additional features on the arm & lever which shroud the barrel of the needle, once the mechanism is extended
8. A catheter tube device with adopts the mechanism described in claims 1 & 2



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INVESTOR IN PEOPLE

Application No: GB 0030238.0  
Claims searched: 1 to 8

Examiner: Stephanie Parry  
Date of search: 6 December 2001

## Patents Act 1977 Search Report under Section 17

### Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.S): A5R (RCQX, RGM, RGN, RGG, RGD)

Int Cl (Ed.7): A61M: 5/178, 5/31, 5/32, 5/46, 5/50

Other: ONLINE: EPODOC, WPI, JAPIO

### Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB 2301036 A (BARON) figs, page 1 line 21-page 3 line 3, page 6 line 9-page 7 line 3	1, 3, 7
X	EP 0344606 A1 (HABLEY) figs, page 2 line 40-page 3 line 17, page 4 lines 5-8, page 5 lines 12-13, page 6 lines 47-52, page 7 lines 26-28	1 to 8
X	US 5910130 (CAIZZA) figs, col 2 line 6 to col 3 line 10, col 4 lines 41-45, col 6 lines 51-54, col 7 lines 7-13, col 8 lines 16-25	1-5, 7, 8
A	US 5445619 (BURNS) figs 3-5, col 4 lines 24-38	-
X	US 4867172 (HABER) figs 9 & 10, col 2 line 62 to col 3 line 16, col 4 lines 34-37, col 6 lines 10-13, col 7 lines 16-21 and 45-47	1-3, 5, 7

X Document indicating lack of novelty or inventive step  
Y Document indicating lack of inventive step if combined with one or more other documents of same category.  
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A Document indicating technological background and/or state of the art.  
P Document published on or after the declared priority date but before the filing date of this invention.  
E Patent document published on or after, but with priority date earlier than, the filing date of this application.